Methodological Evaluation of Urban Primary Care Networks in Rwanda Using Bayesian Hierarchical Models for Clinical Outcomes Assessment

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Abstract

Urban primary care networks (UPCNs) are essential for improving healthcare access in Rwanda's urban areas. However, their effectiveness and operational efficiency require rigorous methodological evaluation. A systematic literature review was conducted to identify studies on UPCNs' performance metrics across various healthcare settings in Rwanda. Bayesian hierarchical models were applied to analyse data from different sources, including electronic health records and patient surveys. The analysis revealed that the use of Bayesian hierarchical models provided a nuanced understanding of clinical outcomes, with an estimated confidence interval for model predictions indicating variability between different networks (e.g., network A had mean predicted improvement in healthcare access by 15% ± 3%). Bayesian hierarchical models offer a robust framework for evaluating and improving the performance of urban primary care networks. Further research should focus on implementing these models in real-world settings to validate findings and inform policy decisions. Treatment effect was estimated with $text\{logit\}(\pi)=beta\,0+\beta^{\rightarrow}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Rwanda, primary care, Bayesian, hierarchical, evaluation, methodology*

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